REMARKS

Applicant appreciates the thorough examination of the present application that is reflected in the Official Action of July 12, 2005. Applicant also appreciates the Examiner's indication that Claims 23-27, 30, 31, 57-61, 64 and 64 would be allowable if rewritten in independent form. However, these claims have not been rewritten in independent form, because Applicant respectfully submits that all of the pending claims are patentable over U.S. Patent 6,133,874 to Krasner and/or U.S. Patent 5,982,324 to Watters et al., for the reasons that will be described in detail below.

Applicant also appreciates the Examiner's withdrawal of the restriction requirement and the Examiner's pointing out that the dependency of Claim 47 was in error. In order to correct this error, Claim 47 has been amended to depend from Claim 46.

Clams 1-9 and 36-44 Are Patentable Over Krasner

Independent Claim 1 recites:

> 1. A wireless communications system comprising:
> a terrestrial wireless network that is configured to transmit wireless communications including Global Positioning System (GPS) data over a satellite frequency band; and
> a mobile terminal that is configured to receive the wireless communications including the GPS data from the terrestrial wireless network over the satellite frequency band and to perform pseudo-range measurements using the GPS data that is received over the satellite frequency band. (Emphasis added.)

The Examiner is referred, for example, to Figure 13 of the present application, wherein GPS data **1322** is terrestrially transmitted and received over a satellite frequency band $\mathbf{F_s}$.

The Official Action contends, at Paragraph 5, that Krasner discloses the recitations of Claim 1, and cites Krasner Column 10, line 3-Column 11, line 60. However, this passage of Krasner states:

> FIG. 4 shows an example of a cell based communication system **10** which includes a plurality of cell sites, each of which is designed to service a particular geographical region or location. Examples of such cellular based or cell based communication systems are well known in the art, such as the cell based telephone systems. The cell based communication system **10** includes two cells **12** and **14**, both of which are defined to be within a cellular service area **11**. In addition, the system **10** includes cells **18** and **20**. It will be appreciated that a plurality of other cells with corresponding cell sites and/or cellular service areas may also be included in the system **10** coupled to one or more cellular switching

centers, such as the cellular switching center **24** and the cellular switching center **24b**.

Within each cell, such as the cell **12**, there is a wireless cell site, or cellular site, such as cell site **13** which includes an antenna **13a** which is designed to communicate through a wireless communication medium with a communication receiver which may be combined with a mobile GPS receiver such as the receiver **16** shown in FIG. **4**. An example of such a combined system having a GPS receiver and a communication system is shown in FIG. **6** and may include both a GPS antenna **77** and a communication system antenna **79**.

Each cell site is coupled to a cellular switching center. In FIG. **4**, cell sites **13**, **15**, and **19** are coupled to switching center **24** through connections **13b**, **15b** and **19b** respectively and cell site **21** is coupled to a different switching center **24b** through connection **21b**. These connections are typically wire line connections between the respective cell site and the cellular switching centers **24** and **24b**. Each cell site includes an antenna for communicating with communication systems serviced by the cell site. In one example, the cell site may be a cellular telephone cell site which communicates with mobile cellular telephones in the area serviced by the cell site. It will be appreciated that a communication system within one cell, such as receiver **22** shown in cell **4**, may in fact communicate with cell site **19** in cell **18** due to blockage (or other reasons why cell site **21** cannot communicate with the receiver **22**).

In a typical embodiment of the present invention, the mobile GPS receiver **16** includes a cell based communication system which is integrated with the GPS receiver such that both the GPS receiver and the communication system are enclosed in the same housing. One example of this is a cellular telephone having an integrated GPS receiver which shares common circuitry with the cellular telephone transceiver. When this combined system is used for cellular telephone communications, transmissions occur between the receiver **16** and the cell site **13**. Transmissions from the receiver **16** to the cell site **13** are then propagated over the connection **13b** to the cellular switching center **24** and then to either another cellular telephone in a cell serviced by the cellular switching center **24** or through a connection **30** (typically wired) to another telephone through the land-based telephone system/network **28**. It will be appreciated that the term wired includes fiber optic and other non wireless connections such as copper cabling, etc. Transmissions from the other telephone which is communicating with the receiver **16** are conveyed from the cellular switching center **24** through the connection **13b** and the cell site **13** back to the receiver **16** in the conventional manner.

The remote data processing system **26** (which may be referred to in some embodiments as a GPS server or a location server) is included in the system **10** and is in one embodiment used to determine the position of a mobile GPS receiver (e.g. receiver **16**) using GPS signals received by the GPS receiver. The GPS server **26** may be coupled to the land-based telephone system/network **28** through a connection **27**, and it may also be

> optionally coupled to the cellular switching center **24** through the connection **25** and also optionally coupled to center **24b** through the connection **25b**. It will be appreciated that connections **25** and **27** are typically wired connections, although they may be wireless. Also shown as an optional component of the system **10** is a query terminal **29** which may consist of another computer system which is coupled through the network **28** to the GPS server **26**. This query terminal **29** may send a request, for the position of a particular GPS receiver in one of the cells, to the GPS server **26** which then initiates a conversation with a particular communication system/GPS receiver through the cellular switching center in order to determine the position of the GPS receiver and report that position back to the query terminal **29**. In another embodiment, a position determination for a GPS receiver may be initiated by a user of a mobile GPS receiver; for example, the user of the mobile GPS receiver may press 911 on the integrated cell phone to indicate an emergency situation at the location of the mobile GPS receiver and this may initiate a location process in the manner described herein.
>
> It should be noted that a cellular based or cell based communication system is a communication system which has more than one transmitter, each of which serves a different geographical area, which is predefined at any instant in time. Typically, each transmitter is a wireless transmitter which serves a cell which has a geographical radius of less than 20 miles, although the area covered depends on the particular cellular system. <u>There are numerous types of cellular communication systems, such as cellular telephones, PCS (personal communication system), SMR (specialized mobile radio), one-way and two-way pager systems, RAM, ARDIS, and wireless packet data systems.</u> Typically, the predefined geographical areas are referred to as cells and a plurality of cells are grouped together into a cellular service area, such as the cellular service area **11** shown in FIG. **4**, and these pluralities of cells are coupled to one or more cellular switching centers which provide connections to land-based telephone systems and/or networks. Service area are often used for billing purposes. Hence, it may be the case that cells in more than one service area are connected to one switching center. For example, in FIG. **4**, cells **1** and **2** are in service area **11** and cell **3** is in service area **13**, but all three are connected to switching center **24**. Alternatively, it is sometimes the case that cells within one service area are connected to different switching centers, especially in dense population areas. In general, a service area is defined as a collection of cells within close geographical proximity to one another. <u>Another class of cellular systems that fits the above description is satellite based, where the cellular basestations or cell sites are satellites that typically orbit the earth. In these systems, the cell sectors and service areas move as a function of time. Examples of such systems include Iridium, Globalstar, Orbcomm, and Odyssey.</u> (Emphasis added.)

As shown by the above-underlined passages, this passage of Krasner clearly describes the use of conventional cellular frequencies to transmit GPS data. Moreover, the last underlined

passage above describes the use of Mobile Satellite Systems (MSS) frequencies to transmit GPS data from space. However, there is no description or suggestion of using a terrestrial wireless network to transmit GPS data over a satellite frequency band, as recited in Claim 1. For at least these reasons, Claim 1 is patentable over Krasner. Claims 2-6 are patentable at least per the patentability of Claim 1 from which they depend.

Moreover, Claim 7 is independently patentable over Krasner. In particular, Claim 7 recites:

> 7. A wireless communications system according to Claim 1 wherein the mobile terminal is further configured to receive GPS coarse/acquisition (C/A) signals from a plurality of GPS satellites, to estimate Doppler shifts in the GPS C/A signals and to estimate received code phases of the GPS C/A signals using the Doppler shifts that are estimated.

The Examiner is respectfully referred to Figure 15 of the present application, which illustrates an example of the processing recited in Claim 7 at Blocks **1510-1530**.

The Official Action contends, at Page 3, that Krasner Column 17, line 45-Column 18, line 49, describes receiving GPS C/A signals from GPS satellites, estimating Doppler shifts in the GSP C/A signals, and estimating received code phases in the GPS C/A signals using the Doppler shifts that are estimated. However, this passage of Krasner simply does not describe this sequence of operations. In particular, this passage of Krasner states:

> The main variations on search reduction are provided in the table of FIG. **10**. The table discriminates along its rows **302** and **304** the accuracy of time of day that may be established at the SPS receiver. The table discriminates along columns **308, 310** and **312**, the nature of the aiding position information that is gotten by the SPS receiver. The entries to the table, **322, 324, 326, 330, 332,** and **334** show whether or not the first processed satellite signal's search range may be reduced. In initial search, an unaided SPS receiver searches over the PN frame, which for the U.S. GPS system (C/A code) is a 1 millisecond period. Hence, if time of day available to the SPS receiver is no better than 1 millisecond, it must search the entire 1 millisecond range for the PN epoch. However, once the first satellite's signal is acquired, the search for the other signals may be done at times relative to the PN epoch found from the first signal's search procedure (i.e. the determination of the first signal's pseudorange). This was discussed previously. If more precision time of day is available at the SPS receiver, then the search range of the first satellite's signal may be reduced. In all cases the search reduction requires approximate knowledge of the satellites' ranges to the SPS (expressed in either distance or equivalent time units, using the speed of light).

> Range information may be provided by three primary methods (314, 316, and 318): (1) providing satellite ephemeris data, (2) providing satellite almanac data and (3) providing satellite range data. Here satellite ephemeris data means a precision mathematical description of the satellites' positions versus time, that is valid for a relatively short period of time, typically less than two hours. Satellite almanac data is a mathematical description of the satellites' positions versus time, that is valid for a relatively long period of time, typically one month. By its nature, then the accuracy of satellites' positions is much poorer with almanac data (typically several kilometer error) relative to ephemeris data (several meters error) and it degrades with time, until the equations are updated. Both ephemeris data and almanac data are transmitted by GPS satellites. The form of this data is typically coefficients associated with Kepler equations. However, alternative descriptions are possible (e.g. spherical harmonic descriptions, etc.) and are consistent with this invention. For example, when almanac or ephemeris data are supplied to the SPS receiver from a remote location server, they may take any of a number of forms, that may allow reduced computation in the SPS receiver or reduced storage, for example. If almanac or ephemeris data are available to the SPS receiver, then the SPS receiver must know its approximate location so that the (approximate) satellite ranges may be computed at a given time. If accurate time is available, then the range and time can be used to estimate the PN frame epochs and reduce search time even for the first satellite's signal to be processed. If only approximate time (greater than 1 millisecond) is available, then the signals subsequent to the first signal acquired can be searched by computing an estimated difference in ranges to the first and subsequent satellites. Then each of the PN frame epochs of the subsequent satellites can be searched in a range that is offset from the PN frame epoch found for the first (or other processed) signal by an amount equal to the estimate range difference (expressed in time units). The third method provides directly the estimated satellite range equations to the SPS receiver. These equations, for example polynomial equations in time or distance, may be provided to the SPS receiver by a remote server which is located close to the SPS receiver or which knows approximately the location of the SPS receiver, and provides appropriate equations for its location. In this case the SPS receiver does not need to know its location since the equations provide the ranges of times to search for each satellite. In effect **326** simply is a direct specification of the ranges of times to search and **334** is a specification of the ranges of times to search relative to the received time of a given satellite signal. (Emphasis added.)

Respectfully, the above passage mentions GPS C/A code and the provision of range information by ephemeris data, almanac data and range data, as noted by the above-underlined passages. Techniques for estimating the PN frame epochs and reducing search time are described. However, this passage does not describe or suggest receiving GPS C/A

signals from GPS satellites, estimating Doppler shifts in the GPS C/A signals and estimating received code phases in the GPS C/A signals using the Doppler shifts that are estimated, as recited in Claim 7. For at least these reasons, Claim 7 is independently patentable.

Claim 8 also is independently patentable. In particular, Claim 8 recites:

> 8. A wireless communications system according to Claim 7 wherein the GPS data that is received from the terrestrial wireless network includes a Doppler shift that is measured at the terrestrial wireless network and a code phase that is measured at the terrestrial wireless network and wherein the mobile terminal is further configured to estimate residual Doppler shifts in the GPS C/A signals due to mobile terminal motion using the Doppler shift and code phase that are measured at the terrestrial wireless network and to estimate the code phases of the GPS C/A signals using the Doppler shift that is estimated.

The Examiner is referred to Figure 16, Blocks **1610-1630** which illustrate exemplary embodiments of Claim 8. The Official Action states, at Pages 3-4, that Krasner Column 7, line 26-Column 8, line 48 describes the recitations of Claim 8. However, this passage states:

> Each of the "pulses" **133, 134** and **138** of this figure represents the time of arrival of the epoch of satellite vehicle's signal (SV). The large vertical lines **131** and **132** represent the PN epochs of the (receiver's) locally generated PN signal. The time T_1 **136** is measured by the receiver and is based upon the measured time-of-arrival of the first SV signal relative to reference PN epoch **131**. Once T_1 is determined the estimated time of arrival of the second satellite signal can be made. This is shown as an offset δT_{nom} **137** relative to the measured time T_1. δT_{nom} is computed by the formula $(R_2 - R_1)/c$, where R_1 is the estimated range from the estimated receiver position on earth to the first GPS satellite and R_2 is the estimated range from the estimated receiver position on earth to the second GPS satellite both using the estimated time-of-day, and where c is the speed of light. As discussed above, the estimated GPS satellite positions, estimated time-of-day and estimated receiver position are all in error to some extent, with the major error normally associated with receiver position. The area **135** around the position $T_1 + \delta T_{nom}$ represents the uncertainty in the time-of-arrival of the PN epochs from the second satellite due to these errors. This is also shown as the range or region E. As illustrated above, this typically may be on the order of tens of microseconds. Since only the region E need be searched for the second SV pseudorange, it is obvious that a great reduction in search time is achieved, relative to searching for time-of-arrival between adjacent PN epochs.
>
> <u>FIG. 3 is a flowchart showing the steps in acquiring the pseudoranges in one example of an efficient manner described above. The processing begins with the acquisition of the first GPS signal in step **161** and the determination of a pseudorange to the corresponding satellite which is transmitting this first signal. Once this is done the time-of-day may be obtained by reading the satellite data message from this signal or</u>

by having such data transmitted from an external source to the receiver. Alternatively, the receiver may have been maintaining a good estimate of time of day using an elapsed time counter. The receiver retrieves in step 163 the approximate user position and satellite position information either from stored information gathered in the past (e.g. almanac data) or via a transmission of such information via a communication link (or even manual entry). From this information the estimated pseudorange (modulo 1 millisecond periods) is estimated in step 165 and a bound on the error (e.g. error range) of this estimate is made in step 167 based upon the errors in the receiver position, time of day, and quality of the satellite position information. The receiver then searches in step 169 the restricted range of possible pseudorange equal to the estimated pseudorange plus and minus the error range. Normally in initial acquisition, the estimated pseudorange is not based on a previously determined pseudorange for the particular SPS satellite. This process is normally repeated for all satellites, in step 171, until they all are acquired. Note that once three satellite signals are acquired, one can normally compute a two-dimensional position fix, which will greatly reduce the position error of the receiver. This information can then be used to further reduce the pseudorange search region for subsequent SV's.

The above approach is especially advantageous when the error due to local oscillator instability does not dominate the acquisition time of the first satellite. Then, the search time is dominated by the search over satellite Doppler and, of course, unknown PN epoch. Thus the approach discussed above can potentially reduce acquisition time of all satellites by an amount approaching M, where M are the number of satellites to be acquired. Further, the various methods and apparatuses of the invention may be used with techniques for providing a stable local oscillator signal which is used to acquire GPS signals, such as those techniques described in copending U.S. patent application Ser. No. 08/612,582 filed Mar. 8, 1996 and copending U.S. patent application Ser. No. 08/759,523 filed Dec. 4, 1996 (both of these applications are hereby incorporated herein by reference).

The method described above dramatically reduces the time to acquire the second and subsequent satellite signals, but does not reduce the time to acquire the first satellite signal. In the example cited above, subsequent GPS signals would be acquired in 1/33 the time of the first. Hence if the first signal required acquisition time D, and 6 signals total were to be acquired, then the total acquisition time would be (1+5/33)D versus 6D if a straightforward search were performed, a savings of a factor of 5.21. In many situations much better improvement can be made if the first signal can be acquired more rapidly. This requires some precise knowledge of absolute time (e.g. less than 100 microsecond error) at the GPS receiver. This can often be done by means of a time transfer mechanism. We assume here that the receiver has approximate knowledge of its position and approximate satellite position information (satellite Almanac). (Emphasis added.)

Although the above passage mentions Doppler shifts and pseudoranges, the above-quoted recitations of Claim 8 are simply not described or suggested. For at least these reasons, Claim 8 is independently patentable.

As noted in the Official Action, Claims 36-44 are method claims corresponding to system Claims 1-9 above. Therefore, they will not be analyzed separately.

Claims 10-19 and 45-53 Are Patentable Over Watters et al.

Claim 10 recites:

> 10. A terrestrial wireless network for a cellular wireless communications system comprising:
>
> a plurality of terrestrial base stations that are configured to transmit wireless communications including global Positioning System (GPS) data to mobile terminals over a satellite frequency band. (Emphasis added.)

The Examiner is referred, for example, to Figure 13 of the present application, wherein GPS data **1322** is terrestrially transmitted and received over a satellite frequency band F_s.

The Official Action contends, at Paragraph 6, that the recitations of Claim 10 are described in Watters et al.'s Abstract, Column 9, line 46-Column 10, line 13, Column 11, lines 17-44 and Column 12, lines 25-67. However, the Watters et al. Abstract states:

> Aspects of global positioning system (GPS) technology and cellular technology are combined in order to provide an effective and efficient position location system. In a first aspect of the invention, a cellular network is utilized to collect differential GPS error correction data, which is forwarded to a mobile terminal over the cellular network. The mobile terminal receives this data, along with GPS pseudoranges using a GPS receiver, and calculates its position using this information. According to a second aspect, when the requisite number of GPS satellites are not in view of the mobile terminal, then a GPS pseudosatellite signal, broadcast from a base station of the cellular network, is received by the mobile terminal and processed as a substitute for the missing GPS satellite signal. A third aspect involves calculating position using GPS when the requisite number of GPS satellites are in view of a GPS receiver, but when the requisite number of GPS satellites are not in view of the GPS receiver, then position is calculated using the cellular network infrastructure. When the requisite number of GPS satellites come back into view of the GPS receiver, then position is again calculated using GPS. A fourth aspect involves using cellular signals already being transmitted from base stations to terminals in a cellular network to calculate a round trip delay, from which a distance calculation between the base station and the terminal can be made. This distance calculation substitutes for a missing GPS satellite signal. (Emphasis added.)

> the GPS satellites. The results of this determination, i.e., the calculated pseudoranges, are then forwarded through the system to the DGPS processor 675 as described below. It should be noted that this may be done automatically in a continuous fashion, i.e., each time the GPS receiver 750 calculates pseudoranges it also forwards the pseudoranges to the DGPS processor 675. Alternatively, it may be done upon a specific request to the GPS receiver 750.
>
> Forwarding of the calculated pseudoranges to the DGPS processor 675 may be carried out by forwarding the calculated pseudoranges to the central processor 715, which multiplexes the calculated pseudoranges into a data stream that is forwarded to the DSP 712. The DSP 712 modulates the data stream into an IF signal and forwards the signal to the radio interface 710. The radio interface 710 converts the IF signal into a radio frequency signal having a frequency that is in the cellular band. The cellular signal is transmitted to be received at the base station 640. Base station 640 demodulates the signal, and forwards the demodulated signal message through the data links to the DGPS processor 675. If the signal message passes through data link 635 to the MTSO 610, the MTSO extracts the calculated pseudorange messages, for example, by using the processing unit 615, and forwards them over the data link 612 to the DGPS processor 675. If the signal message passes through data link 636 to a communications network, it will be received by the DGPS processor through data link 614 where the relevant pseudorange messages may be extracted. (Emphasis added.)

GPS signals and conventional cellular signals are described. However, receiving GPS data over a satellite frequency band that is outside a GPS frequency band is not described.

Column 19, line 48-Column 20, line 13 states:

> First, in FIG. 10, a mobile terminal 1000 includes a GPS receiver portion 1005, a mobile cellular portion 1010, and a central processor 1015. Of course, the central processor 1015 may alternatively be formed integral with either the GPS receiver portion 1005 or the mobile cellular portion 1010, or a single processor can be used that performs the functions of all three components. GPS receiver portion 1005 includes a GPS processor 1020 for calculating position, while the mobile cellular portion 1010 contains a cellular position processor 1025 that computes position using the cellular network infrastructure. Finally, as shown in FIG. 10, base stations 1030, 1035, and 1040 are part of the cellular network, and for purposes of explanation, they represent the base stations whose transmitting vicinity includes the location of the mobile terminal 1000.
>
> Operation of the mobile terminal 1000 for determining position is described in connection with the flowchart in FIG. 11. At block 1100, GPS receiver portion 1010 obtains a first fix on the location of the mobile terminal, if necessary. Next, at block 1105, the first fix location and the locations of three (or more) nearby base stations are transmitted to cellular position processor 1025. In this case, the nearby base stations are base stations 1030, 1035, and 1040. Cellular position processor 1025 utilizes

> this information, along with the location of mobile terminal **1000** as determined in step **1100**, to determine the expected time difference of arrival of periodic signals from base stations **1030**, **1035**, and **1040**. For the purposes of this explanation, it is assumed that periodic signals are available in the cellular network, and the mobile terminal uses the TDOA process, described earlier, to determine its position from the cellular network signals. However, the cellular position processor could alternatively use a TOA technique. (Emphasis added.)

Again, cellular and GPS frequencies are described, but the receipt of GPS data over a satellite frequency band that is outside the GPS frequency band is not described or suggested. The remaining cited passages will not be quoted herein; however, Applicant respectfully submits that these passages, likewise, do not describe or suggest receiving GPS data over a satellite frequency band that is outside a GPS frequency band.

Dependent Claims 18-20 are patentable at least per the patentability of Claim 17 from which they depend. Moreover, Claim 19 is independently patentable. In particular, Claim 19 recites:

> 19. A mobile terminal according to Claim 17 wherein the receiver is further configured to receive GPS C/A signals from a plurality of GPS satellites and wherein the processor is further configured to estimate Doppler shifts in the GPS C/A signals and to estimate received code phases of the GPS C/A signals using the Doppler shifts that are estimated.

The Official Action cites Watters et al., Column 16, line 40-Column 17, line 11. This passage states:

> The cellular signal broadcast from the base station **800**, which contains both the pseudosatellite signal and other cellular signals, is received at the mobile terminal **900** by the cellular radio antenna **915**, and is then processed through the low-noise amplifier **920**, the down converter **925**, and the filter **930**. These last three elements work to convert the received signal, which has a radio frequency in the cellular band, into a signal having a predetermined intermediate frequency (IF). Of course, any suitable converter may replace the shown low-noise amplifier **920**, down converter **925**, and filter **930**. The IF signal is forwarded to the IF section and base band processor **935**, and depending on its contents, is forwarded to the necessary destination in the mobile terminal **900**. For example, voice data would be forwarded to audio outputs **936**, and control data is forwarded to the control processing unit **940**. In addition, the IF signal is also forwarded to the automatic gain controller **990** and thereafter to the switch **995**, at input A. The automatic gain controller **990** adjusts the amplitude of the pseudosatellite signal to correspond to the GPS satellite signals, which are described below.

> It should be noted that the filter **930** must be constructed to be capable of handling pseudosatellite signals, which are typically wider than conventional cellular signals. Based on the present scheme of satellite signals transmitting at frequencies described above--e.g., C/A code with 1.023 MHz rate--the filter **930** should have the requisite width. For example, a width of at least approximately 2 MHz may be used. In that regard, it is most practical if the cellular system have a bandwidth that is similar to the pseudosatellite signal bandwidth. The typical bandwidth of IS-95 CDMA cellular signals is approximately 1.25 MHz. Therefore, a GPS pseudosatellite signal that is approximately 2 MHz wide could underlay the center of one IS-95 channel, which would mean that it would also overlap two adjacent channels. Other options for transmission over the IS-95 channels could be used. The IF section of **935** will typically include a channel selection filter to separate the desired cellular channel from the other, overlapped, cellular channels. (Emphasis added.)

Although C/A signals are mentioned, the estimation of Doppler shifts in GPS C/A signals and the estimation of received code phases in the C/A signals using the Doppler shifts that are estimated, is not described or suggested in this passage. For at least these reasons, Claim 19 is independently patentable.

As noted in the Official Action, Claims 45-49 and 50-53 are method analogs. They will, therefore, not be analyzed separately.

Claims 20-22, 28-29, 32-35, 54-56, 62-63 And 66-69 Are Patentable Over Watters et al. In View Of Krasner

Claims 20-22, 28-29, 32-35, 54-56, 62-63 and 66-69 stand rejected under 35 USC §103(a) over Watters et al. in view of Krasner. Applicant respectfully submits, however, that a *prima facie* case of obviousness has not been made because, even if the references are combined, the recitations of these claims are simply not met.

In particular, to establish a *prima facie* case of obviousness, the prior art reference or references when combined must teach or suggest all the recitations of the claims, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *See* M.P.E.P. § 2143. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art ***also suggests the desirability of the combination***. *See* M.P.E.P. § 2143.01(citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)). As emphasized by the Court of Appeals for the Federal Circuit, to support combining references, evidence of a suggestion, teaching,

or motivation to combine must be ***clear and particular***, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of references. *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). In another decision, the Court of Appeals for the Federal Circuit has stated that, to support combining or modifying references, there must be particular evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

Applicant respectfully submits that it would not be obvious to selectively pick and choose portions of Krasner and Watters et al., and somehow combine them. Moreover, even if combined, many of the claim recitations simply are not described or suggested.

For example, as to Claim 20, the Official Action concedes, at Paragraph 8, that Watters et al. does not disclose a Doppler shift and a code phase, but contends that Krasner discloses the recitations of Claim 20. However, Krasner does not disclose the recitations of Claim 20, for the same reasons that were described above in connection with Claim 8. This analysis will not be repeated for the sake of brevity.

As to Claim 21, the Official Action concedes, at Page 7, that Watters et al. does not disclose a Doppler shift, but contends that Krasner discloses the recitations of Claim 21. However, as was already shown above in connection with Claim 7, the recitations included in the processor of Claim 21 are not described or suggested by Krasner. This analysis will not be repeated for the sake of brevity.

Claim 22 is patentable for the same reasons that were described above in connection with Claim 20. This analysis will not be repeated for the sake of brevity.

The Official Action has agreed that Claims 23-27 are independently patentable. Claims 28-29 are patentable at least per the patentability of the independent claims from which they depend.

The Official Action has also agreed that Claims 30 and 31 are independently patentable. Claims 32-35 are patentable at least per the patentability of the independent claims from which they depend. Finally, Claims 54-58, 62-63 and 66-69 are method analogs of the above claims. They will, therefore, not be analyzed separately.

Conclusion

Applicant again appreciates the thorough examination, the withdrawal of the restriction requirement and the indication that many of the claims would be allowable. Applicant has now shown, however, that none of the pending claims are anticipated by or obvious in view of Krasner and/or Watters et al. Accordingly, Applicant respectfully requests withdrawal of the outstanding rejections and allowance of the present application. Finally, should the rejections be maintained, Applicant respectfully request the Examiner to indicate where the cited passages describe the specific claim recitations, rather than citing the lengthy passages by column and line number alone.

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Susan E. Freedman

Susan E. Freedman
Date of Signature: September 19, 2005

Applicant also wishes to make it clear to the Examiner that the "GPS pseudosatellite signal" referred to in the above-underlined portions, does not use satellite frequencies but, rather, uses cellular frequencies, as noted in Watters et al. Column 18, line 62-Column 19, line 5:

> In addition, the present invention overcomes the problem that with dedicated reference stations broadcasting pseudosatellite signals, the pseudosatellite signal is stronger than actual GPS satellite signals and drowns out the GPS satellite signals. In the present invention, the pseudosatellite signal produced and broadcast by the base station will not interfere in any way with the actual GPS satellite signals, and therefore will not drown out the GPS satellite signals. <u>In fact, the two are broadcast in completely different frequency bands.</u> That is, the GPS satellite signals are broadcast in the satellite band, while <u>the base station broadcasts the pseudosatellite signal in the cellular band</u>. (Emphasis added.)

Accordingly, satellite frequencies are not used terrestrially. Continuing with the passages of Watters et al. that were cited by the Examiner, Watters et al. Column 9, line 46-Column 10, line 13 recites:

> Referring to FIGS. 4 and 5, a first aspect of a position location system of the present invention will be described. Broadly, FIG. 4 shows a source for DGPS error correction data **400**, a cellular mobile telecommunications switching unit **410**, and a base station **440**. FIG. 5 shows a mobile terminal **500**, which is typically at a remote location relative to the cellular mobile telecommunications switching unit and in the transmitting vicinity of the base station **440**. The transmitting vicinity is the area over which the base station broadcasts its signals. In general, this aspect of the invention involves the use of the cellular network to transmit DGPS error correction data to the mobile terminal, where it is used to perform corrections on pseudorange data also received at the mobile terminal.
>
> First, in FIG. 4, the source **400** is responsible for providing DGPS error correction data (i.e., differential error correction data). Numerous alternatives for source **400** exist to provide such information, including using Government sources, commercial operators, or the cellular operator. For example, the source **400** may be a Government source, such as the Coast Guard, which broadcasts DGPS error correction data as radio signals from reference stations that it has established. Alternatively, a commercial supplier may be used to supply the DGPS error correction data. Two examples of such commercial suppliers are Differential Correction, Inc. (DCI) of California, and Omnistar, Inc. of Texas. In particular, DCI currently uses FM radio stations to broadcast the correction information while <u>Omnistar uses a geostationary satellite to broadcast the correction information</u>.
>
> A third alternative is that the cellular provider set up its own reference stations that calculate the pseudorange corrections for each

> visible satellite and broadcast them over the cellular network. In that case, the reference stations may be part of the base stations in <u>the cellular network</u> system. (Emphasis added.)

Column 11, lines 17-44 state:

> An analogous FIG. 4A shows the preferred arrangement. In this arrangement the source of DGPS data **400** is connected to a communications network **460** by a data link **406**. In this view the source of DGPS data may be, for example, a workstation or server attached to the Internet and providing DGPS data for many base stations in one or more mobile networks. Although this server provides a logically separate function, it may be combined with, or physically located in conjunction with, a part of the communications network (for example such as an MTSO). It should be noted that the communications network may simply be an MTSO (as shown in FIG. 4), include an MTSO or a plurality of MTSOs with other components, or may itself not include any MTSOs. The server may also be operated by a third party, separate from the mobile network operator, and located remotely from the communications network components. The base station **440** is also connected to the communications network through data link **436**. The communications network interconnects the source of DGPS data and the base station and provides the similar functions to the MTSO shown in FIG. **4** of receiving messages from the DGPS source and combining these together with other data and messages destined for the base station for transmission to the mobile terminals served by the base station. Such a communications network, for example, is provided by the Internet and the associated Internet protocols (IP) for addressing, formatting, sending and receiving messages to devices attached to the network

Finally, Column 12, lines 25-67 state:

> An alternative structure for carrying out the correction of the pseudoranges is shown by FIGS. **6**, **6A** and **7**. Much of the structure remains similar as in the embodiment shown in FIGS. **4**, **4A** and **5**, for which analogous reference numerals have been used. However, in this embodiment, the mobile terminal **700** has no DGPS processor. Rather, a DGPS processor **675** is connected to a source of DGPS data **600** by a data link **605**, and is connected by another data link **612** to a processing unit **615** (which may be a multitude of processors) in a MTSO **610**.
>
> The remaining elements are a central unit **620**, a multiplexer **625**, and a switching unit **630** in the MTSO **610**, a data link **635**, and a base station **640** that includes a base station modulator **645**, a radio interface **650** and a base station antenna **655**.
>
> An analogous FIG. **6A** shows the preferred arrangement. In this arrangement the source of DGPS data **600** is connected to a communications network **660** by a data link **606**. In this view the source of DGPS data may be, for example, a workstation or server attached to the Internet and providing DGPS data to one or more base stations in one or more mobile networks. Similarly the DGPS processor **675** is also attached

> to the communications network through data link **614**. In this view the DGPS processor may also be, for example, a server attached to the Internet and providing DGPS processing services for one or more base stations and their associated mobile terminals in one or more mobile networks. The base station **640** is also connected to the communications network through data link **636**. The communications network interconnects the source of DGPS data, the DGPS processor and the base station and provides the similar functions to the MTSO shown in FIG. **6** of receiving messages from the DGPS source and combining these together with other data and messages destined for the base station for transmission to the mobile terminals served by the base station. Similarly the communications network provides the function of transporting messages reporting GPS pseudoranges received by the base station from the mobile terminals to the DGPS processor. Such a communications network, for example, is provided by the Internet and the associated Internet protocols (IP) for addressing, formatting, sending and receiving messages to devices attached to the network.

Respectfully, although these passages recite the use of a conventional cellular network infrastructure or a space-based infrastructure to transmit GPS data, none of these passages describe or suggest terrestrial base stations that transmit GPS data to mobile terminals over a satellite frequency band, as recited in Claim 10. For at least these reasons, Claim 10 is patentable. Claims 11-16 are patentable at least per the patentability of Claim 10 from which they depend.

Independent Claim 17 recites:

> 17. A mobile terminal comprising:
>
> a receiver that is configured to receive wireless communications including Global Positioning System <u>(GPS) data over a satellite frequency band that is outside a GPS frequency band</u>; and
>
> a processor that is configured to perform pseudo-range measurements using the GPS data that is received over the satellite frequency band that is outside the GPS frequency band. (Emphasis added.)

In rejecting Claim 17, the Official Action cites Watters et al. Column 13, lines 1-37, Column 19, line 48-Column 20, line 13, Column 11, line 45-Column 12, line 24, Column 13, lines 38-67 and Column 20, line 14-Column 21, line 32. However, Column 13, lines 1-37 state:

> Furthermore, the mobile terminal **700** contains <u>a cellular antenna **705**</u>, a radio interface **710**, a digital signal processor (DSP) **712**, a central processor **715**, a control unit **725**, a speaker **730**, and a GPS receiver **750** having a <u>GPS antenna 755</u>.
>
> In this embodiment, the GPS receiver **750** receives satellite signals by the GPS antenna **755** from the GPS satellites that are in its view and calculates the pseudoranges between the mobile terminal **700** and each of